

Claims

1. A composition capable of forming a coating and comprising a mixture of a conductive polymer in colloidal form and carbon.
2. The composition according to claim 1, wherein the conductive polymer is selected from polymers of anilines, thiophenes, pyrroles and substituted derivatives thereof.
3. The composition according to claim 1 or claim 2, wherein two or more different conductive polymers are present.
4. The composition according to any one of the preceding claims, wherein the carbon has a specific surface area of more than $100 \text{ m}^2/\text{g}$, as measured according to the BET method.
5. The composition according to any one of the preceding claims, wherein the carbon is selected from graphite, carbon black, nanotubes and fullerenes.
6. The composition according to claim 5, wherein the carbon is active carbon black.
7. The composition according to claim 6, wherein the active carbon black has a specific surface of greater than $750 \text{ m}^2/\text{g}$.
8. The composition according to any one of the preceding claims, wherein the average particle size (number average) of the conductive polymer is smaller than 500 nm.
9. The composition according to any one of the preceding claims, wherein the conductivity of the conductive polymer is greater than 10^{-5} S/cm .

10. The composition according to claim 9, wherein the conductivity is greater than 10 S/cm.
11. The composition according to claim 10, wherein the conductivity is greater than 100 S/cm.
12. The composition according to any one of the preceding claims, wherein the weight ratio of the conductive polymer to carbon is in the range of from 1 : 50 to 50 : 1.
13. The composition according to any one of the preceding claims, further comprising a liquid dispersion medium in a concentration of from 40 to 99.5 weight percent, wherein the dispersion medium liquid is evaporable under ambient conditions, and other non-evaporable additives in a concentration of from 0 to 10 weight percent, the conductive polymer and carbon components being present in a concentration of from 0.5 to 60 weight percent, all weight percentages being based on the total composition.
14. The composition according to claim 13, wherein the liquid dispersion medium comprises water and/or organic solvent(s).
15. A method for manufacture of a composition according to any one of the preceding claims, comprising dispersing the conductive polymer and carbon, and optionally additives in a liquid dispersion medium and optionally drying the liquid dispersion after application on a substrate.
16. The method of claim 15, wherein the conductive polymer is dispersed in a first liquid and the carbon is dispersed separately in a second liquid, said liquids being the same or different, and the respective dispersions are subsequently mixed together, optional additives being added before, during or after the separate dispersion steps.

17. The method of claim 15, wherein the conductive polymer is dispersed in a liquid and the carbon is separately milled in the absence of liquid, and wherein the dry milled carbon is subsequently added to the liquid colloidal dispersion of the conductive polymer and dispersed therein.
18. A composite material comprising the composition according to any one of claims 1 to 14 or the composition obtained by the method of any one of claims 15 to 17 in the form of a coating on a substrate.
19. The composite material of claim 18, wherein the substrate is selected from the group consisting of metals, semiconductors, plastics, ceramics and wood products.
20. An electrical or electronic article comprising the composition according to any one of claims 1 to 14 or the composite material according to claim 18 or claim 19.
21. The article of claim 20, wherein the article is selected from the group consisting of conductors, energy stores, sensors, switches, condensers, capacitors and supercapacitors, double layer capacitors and redox capacitors.
22. The article of claim 21, said article being a capacitor comprising an electrolyte and a pair of electrodes with a separator disposed therebetween, wherein at least one of the electrodes comprises the composition according to any one of claims 1 to 14 or the composite material according to claim 18 or claim 19.
23. The capacitor of claim 22, wherein both electrodes comprise the composition according to any one of claims 1 to 14 or the composite material according to claim 18 or claim 19.

24. The capacitor of claim 22, wherein one electrode comprises the composition according to any one of claims 1 to 14 or the composite material according to claim 17 or claim 18 and the other electrode is a conventional capacitor electrode.
25. The capacitor of claim 24, wherein the other electrode comprises a current collector coated with a composition containing an intrinsically conductive polymer but no carbon.